F·A·A·M facility for airborne atmospheric measurements

FLIGHT FOLDER

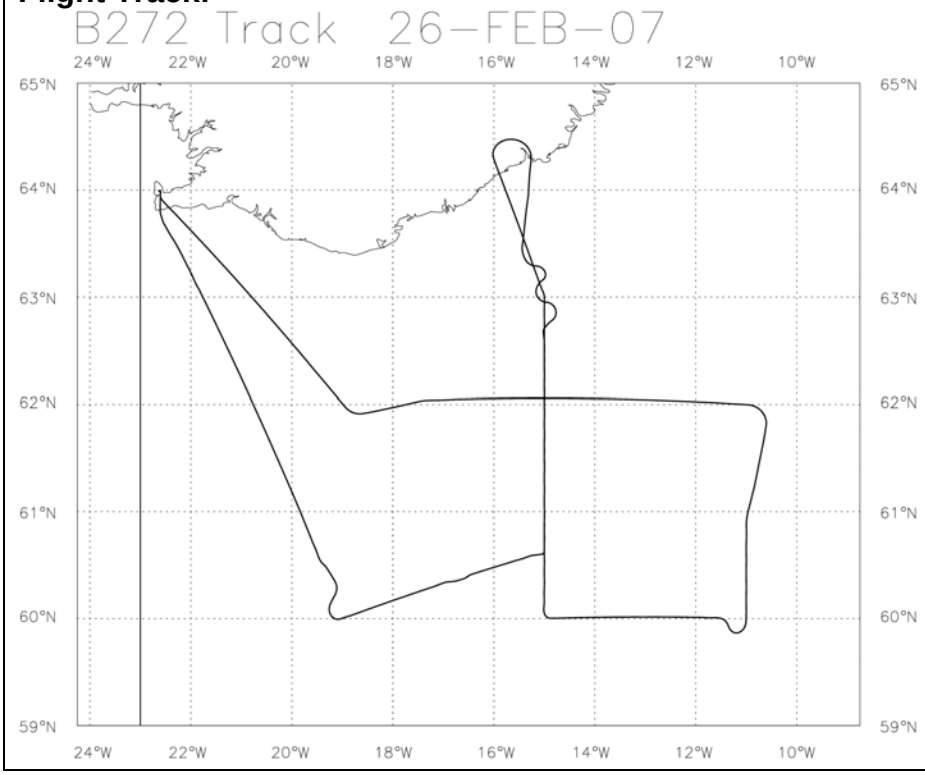
Flight No.:	B272
Date:	26 February 2007
Take Off	08:54:54
Landing:	14:23:35
Flight Time	5h28m41

Campaign: GFDEX – Mesoscale Cyclone and Targeted observations of SAP south of Iceland (Plan 44)

Operating Area: South of Iceland (Targ Obs)

POB	Position	Name	Institute
1	Captain	Alan Foster	DFL
2	Co-pilot	Ian Ramsay Rae	DFL
3	CCM	Dawn Quinn	DFL
4	Mission Scientist 1	Ian Renfrew	University of Toronto
5	Flight Manager	Alan Woolley	FAAM
6	Core Chemistry / AVAPS / CCM2	Bob Wells	FAAM
7	Mission Scientist 2	Nina Petersen	UEA
8	Mission Scientist 3	Emma Irvine	Reading University
9	Mission Scientist 4	Dave Sproson	UEA
10	Mission Scientist 5	Inge Johansson	University of Bergen, Norway
11	Mission Scientist 6	Haraldur Olafsson	University of Iceland, Iceland
12			
13			
14			
15			
16			
17			
18			
19			
20			

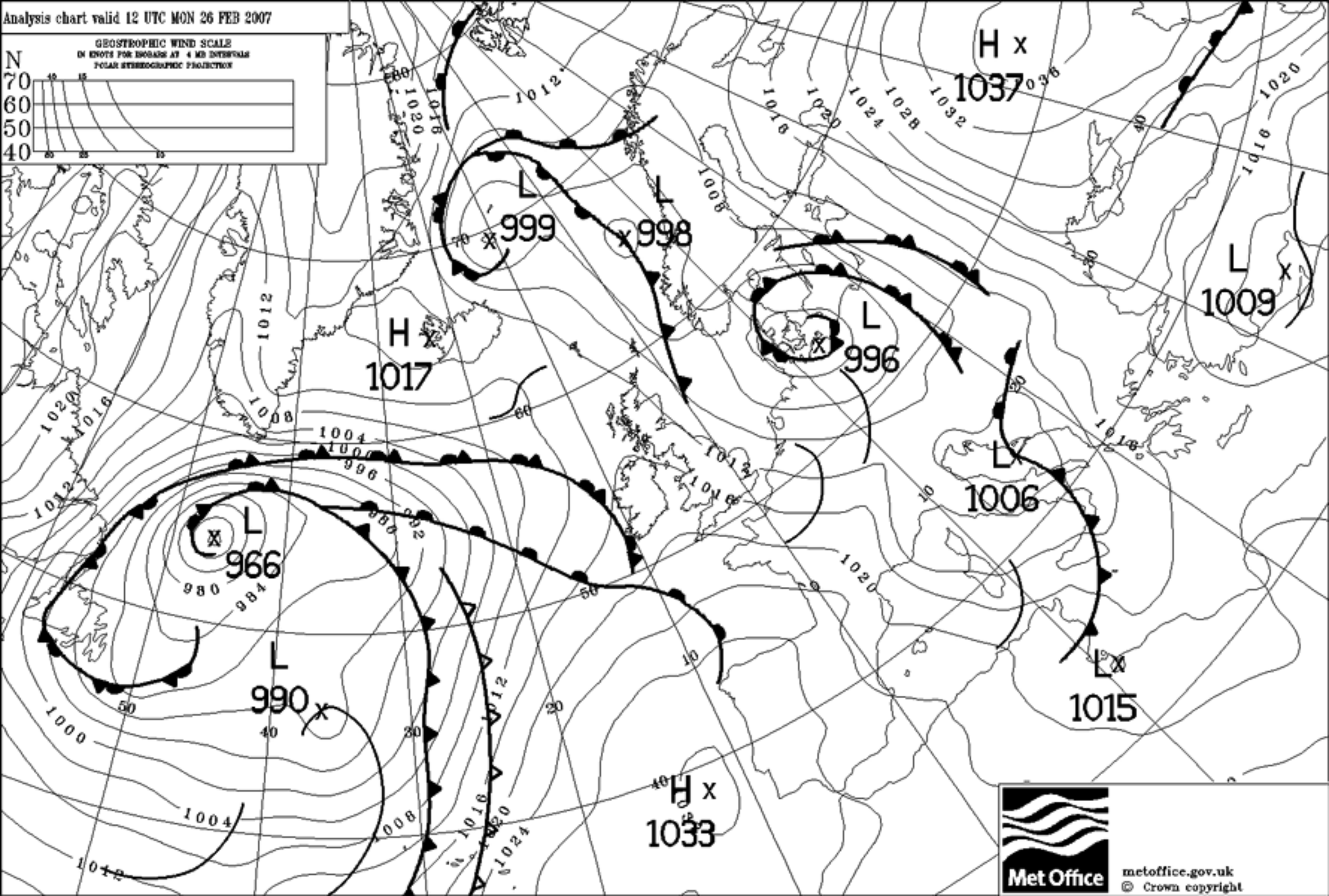
Flight Track:



FLIGHT SUMMARY

Flight No b272
Date: 26/2/07
Project: GFDEX
Location: SE of Iceland

Start Time	End Time	Event	Height (s)	Hdg	Comments
065640		Start-Up	0.00 kft	078	63'59.66N, 22'37.66W
084444		inu to nav	0.06 kft	078	
084540		engine start	0.06 kft	078	
085024		taxy	0.06 kft	094	
085454		T/O	0.08 kft	179	from Keflavik
090448		jw/nevz	17.2 kft	140	zero
092229	095834	Run 1	25.0 kft	147	
092229		Sonde 1			
092747		Sonde 2	25.0 kft	070	
093246		Sonde 3	25.0 kft	084	
093801		Sonde 4	25.0 kft	085	
094310		Sonde 5	25.0 kft	085	
094851		Sonde 6	25.0 kft	087	
095342		Sonde 7	25.0 kft	088	
095834		Sonde 8			
102142		Sonde 9	25.0 kft	194	
105155		Sonde 10	26.0 kft	281	
110203		jw/nevz	26.0 kft	346	zero
111207		Sonde 11	27.0 kft	345	
113030		Sonde 12	27.0 kft	348	
114705		Sonde 13	27.0 kft	338	
115847	121515	Profile 1	26.6 kft	194	rate of dec 200fpm
120013	121515	Profile 1	24.2 - 2.2 kft	194	
120128		Profile 1	21.3 kft	195	rod 3000ft/min
120149		Profile 1	20.2 kft	191	
120441		Profile 1	14.3 kft	101	1500ft/min
120659		Profile 1	11.5 kft	235	1000ft/min
121403		jw/nevz	3.5 kft	211	zero
121516	125048	Run 2	2.2 - 2.0 kft	227	
131956		Sonde 14	28.0 kft	259	
142335		Land	0.09 kft	002	at Keflavik


Analysis chart valid 12 UTC MON 26 FEB 2007
GEOSTROPHIC WIND SCALE
IN KNOTS FOR ISOBARS AT 4 MB INTERVALS
POLAR STEREOGRAPHIC PROJECTION
N
70
60
50
40
H x
1037
L
999
L
998
L
996
L
1009
H x
1017
L
966
L
990
H x
1033
L x
1006
L x
1015
Met Office
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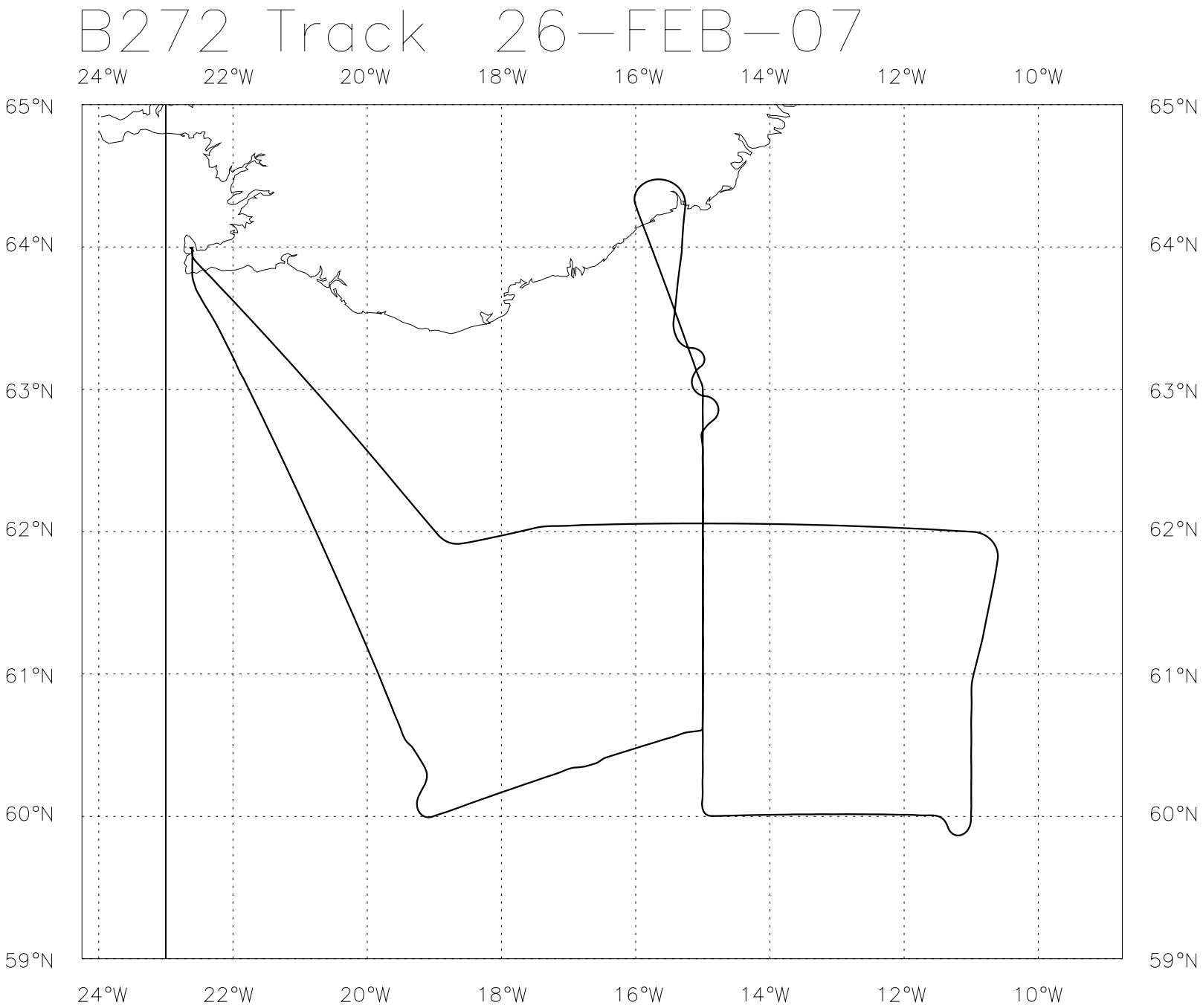

B272 Track 26-FEB-07
24°W
22°W
20°W
18°W
16°W
14°W
12°W
10°W
65°N
64°N
63°N
62°N
61°N
60°N
59°N

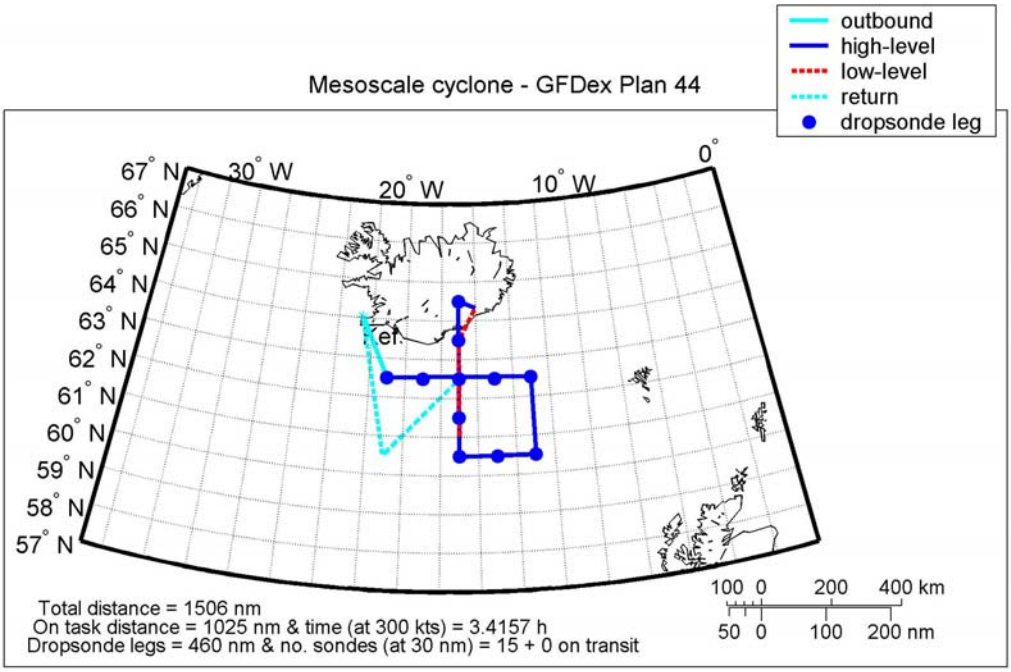
GFDex Sortie Brief – B272 – 26 February 2007
Mesoscale Cyclone and Targeted observations of SAP south of Iceland (Plan 44)

Mission Scientists: Ian Renfrew, Nina Petersen, Emma Irvine, Inge Johansson, Haraldur Olafsson, Dave Sproson

Aims

- Map out 3D structure of mesoscale cyclone using a mixture of high-level and low-level legs
- High-level legs at 25-27 kft, straight and level, cutting through cyclone with cross.
- Low-level legs at 2000 ft and 5000 ft, straight and level, to sample wind, temperature, etc
- Dropsonde sampling every 30 nm (30-50 km) within cyclone
- Dropsonde release near Icelandic coast for topographic gravity waves
- Dropsonde releases evenly spaced around SAP for Targeted observation purposes

GFD44	Time	Manoeuvre	Distance (nm)	Duration (min)	Total time (min)
1	0900	Take off Keflavík , transit to 62.5N, 21W.	100	~20	~20
2		Straight level run at 25-30 kft, due east to 62.5N, 13W. Most efficient speed. **Dropsonde releases every 30 nm (7 in total)**	221	~45	~65
3		High-level leg due south (heading 180^{o}) to 60.5N, 13W.**Dropsonde release here.**	120	~25	~90
4		High-level leg due west (heading 270^{o}) to 60.5N, 17W.**Dropsonde release here**.	118	~25	~115
5		Straight level run at 25-30 kft, due north to 64.5N, 17W. From 61.5 N to 63.5N, **Dropsonde releases every 30 nm (4 in total).**	240	~50	~165
6		High-level leg from 64.5N, 17W to 64.33N, 16W. **Dropsonde release here**	28	~6	~170
7		Profile descent to 63.5N, 17W. Fast descent (2000 ft per min?) to 10 kft. Slower descent (1000 ft per min) to 2000 ft.	56	~20	~190
8		Straight low-level leg at 2000 ft to 61N, 17W (heading due south). Science speed	150	~45	~235
9		Climb and turn to head due north to 62.5N, 17W at 5000 ft	90	~20	~255
10		Climb and head to 60.5N, 21W. **Dropsonde release here**	165	~30	~285
11		Transit to Keflavik	215	~35	~320


outbound
high-level
low-level
return
dropsonde leg
Mesoscale cyclone - GFDex Plan 44
67° N
66° N
65° N
64° N
63° N
62° N
61° N
60° N
59° N
58° N
57° N
30° W
20° W
10° W
0°
Ef
Total distance = 1506 nm
On task distance = 1025 nm & time (at 300 kts) = 3.4157 h
Dropsonde legs = 460 nm & no. sondes (at 30 nm) = 15 + 0 on transit
100 0 200 400 km
50 0 100 200 nm

Mission Scientists Debriefing Sheet

Flight No. **B272**
Mesoscale Cyclone and Targeted observations of SAP south of Iceland (Plan 44)
Date: **26 February 2007**

Aims

- Map out 3D structure of mesoscale cyclone using a mixture of high-level and low-level legs
- High-level legs at 25-27 kft, straight and level, cutting through cyclone with cross.
- Low-level legs at 2000 ft and 5000 ft, straight and level, to sample wind, temperature, etc
- Dropsonde sampling every 30 nm (30-50 km) within cyclone
- Dropsonde release near Icelandic coast for topographic gravity waves
- Dropsonde releases evenly spaced around SAP for Targeted observation purposes

Assessment of the Flight

Generally successful, with some dropsonde problems.

14 Dropsondes were released, with a higher density of sondes released in area of weak mesoscale cyclone. Two dropsondes did not generate a launch code and so could NOT be sent to the GTS. These were drop numbers 7 and 12 (unfortunately failure of 12 affected targeted observation component of mission). Drop 3 did not have any data till 800 mb. All dropsondes that could be transmitted onto the GTS in real time, made the Met Office database in time for the 12 UTC forecast, i.e. made the QG cycle.

Dropsonde cross-sections did not fully capture the weak mesocyclone – it had moved out of the area that we had notam's to drop into. However there was some signature.

Low-level (2000 ft) leg did capture flow reveral associated with mesoscale cyclone, towards end of this leg. Hence this leg was extended (in flight) to fully capture the cyclone. Some interesting cloud physics. Cloud base around 2000 to 1500 feet.

Summary of weather conditions

Generally easterly flow.
Convective and stratus cloud associated with weak mesoscale cyclone. Clear air immediately in the wake of Iceland.

Ian Renfrew

Mission Scientist's Log

Flight No B.272.. Date 26 Feb 07 Name Ian Renfrew Page 1 of 2

GMT	Run / Profile	Height	Hdg	GPS Position	Remarks (clouds, weather, visibility, winds, sea state etc.)
08.55	1			Keflavik	Take off
9.[illegible]22	[illegible]2	25 kft	90	62N 19W	Drop1 – 9.33 landed : 6 ms^{-1}, 50 deg RH large at 850 mb
9.25	2	"	"		Above broken cloud deck, some convective clouds ahead.
	2	"	"	[illegible]	
9.28	2	"	"	62N 17°42'	Drop2 – RH↑ 820 mb 7 m/s 60 deg
936 9.32	2	"	"	62N 16°36	Drop3 – no data till 800 mb 11 ms^{-1} 60 deg
938 9.37	2	"	"	62N 15°36'	Drop4 – [illegible] RH to 830 mb [illegible] 10 m/s 70 deg
9.43	2	"	"	62N 14°24'	Drop5 – RH↑ 750 mb 9 m/s : 50 deg
9.48	2	"	"	62N	Drop6 – RH↑ 550 mb 7 ms^{-1}, shear to 110 deg at 900
9.50 ? 9.53	2	"	"	62N 12°W	Drop 7 – No launch parameter. → No GTS *
9.58	2	"	"	62N 11°W	Drop8 – RH↑ 550 mb 3 ms^{-1} 310 deg
9.58	3	"	180	"	End of Run
10.21	3	"	180	60N 11W	Drop9 – RH, 2 weaker maxima, no well defined cloud top. 2 m/s 150°, shear to 5 m/s, 250 at 900
10.51	4	26 kft	270	60N 14°[illegible]W	Drop10 – RH, 2 maxima at 850 & 700 6 ms^{-1} 280°
11.10	5	27 kft.	0	61.5N 15W	Climb
11.12	5	"	0	61.5 15W	Drop11 – RH 800 mb, cloud deck base and 270° to 800 mb 9 ms^{-1} 40°, shear to 2 m/s at 900 mb
11.22	5	"	0	62°42' 15W	Clouds clearing below. Next drop into clear air
11.30	5	"	0	63° 15W	Drop12 – No launch parameter → No GTS *
11.30	6	"	329	"	Turn.
11.47	6	"		[illegible]64°11' 16W	Drop13 – RH 40% or lower, some T perturbations Many waves in u's & w's
11.47	7				Turn & slow descent
11.58	7	Descent		[illegible]°	Profile descent
11.59	7	24 kft		63°36' 15W	2000 ft per min ascent, 3000 ft per min

Mission Scientist's Log

Flight No **B**372 Date 26 Feb 07 Name Ian Renfrew Page 2 of 2

GMT	Run / Profile	Height	Hdg	GPS Position	Remarks (clouds, weather, visibility, winds, sea state etc.)
12·07	7	10 kft			1000 feet per mind
12·15	8	2 kft		62° 42' 15	Start Run
					Clear osillations in Td on descent & run
					- perhaps roll vortices.
12·26	8	"		62N	Pass under E-W leg.
"	8			62 N	Edge of cloud, cloud base ~2000 feet.
12·32	8	"		61°42N	Cloud base ~1500, tops ~ 2500 ft.
~~12·38~~	~~8~~	~~"~~			Winds increased from 8 to 12 m/s
12·38	8				Start of wind veer
* 12·40					Zero E wind line.
12·46					Cloud layer denser & ice particles
					INS Wind speed dropped from 13 to 8 m/s
					Strong perturbation in θ_e at 12.40 - 12.45
					Static pressure - no clear signature
13·19	9	28 kft.		60N 19W	Drop 14
13·19	10				Transit to Kef.
14·30					

Mission Scientist's Log

Flight No B272 Date 26.02.07 Name Emma GNP Page 1 of 3

GMT	Run / Profile	Height	Hdg	GPS Position	Remarks (clouds, weather, visibility, winds, sea state etc.)
08.55					Take off
		#2			8 drops. release not 7
9.25					DS1
09:22	1	25kft	147	62°0N 18°54W	Dropsonde 1 released
~~09:~~	~~+~~	~~25kft~~	~~147~~		p = 375mb, v = 324kts cumulus
09:27	1	25kft	70	61°54N ~~1~~48W	Dropsonde 2 (appear as #3)
					p = 375mb v = 334kts cumulus
09:33	1	25kft	70	62°N 16°30W	Dropsonde 3
					p = 375mb v = 325kts shallow cumulus to left deeper to right with cirrus layer on top, some icing in larger convective clouds
09:38	1	25kft	~~84~~	62°N 15°30W	Dropsonde 4
					p = 375mb v = 310kts
09:43	~~1~~	25kft	85	62°N 14°24W	Dropsonde 5
					p = 375mb v = 319kts
09:49	~~1~~	25kft	85	62°N 13°6W	Dropsonde 6 more ~~cu~~ stratocu on left, cloud amount increasing to S.
					p = 375mb v = 326kts
09:54	+	25kft	87	62°N 12°W	Dropsonde 7 Cirrus shield evident to SE, top ~18-20kft cloud height increasing.
					p = 375mb v = 324kts
09:59	~~1~~	25kft	88	~~62°N~~ 61°54N 11°W	Dropsonde 8
					p = 375mb v = 327kts
10.22		25kft	195	60°24'N 11°0 W	DS9. Clear underneath
					p = 375 hPa v = 307kt.
10.52		26 kft	280	60°0N 14°42W	DS10
					p = 359 hPa v = 329kt.

Mission Scientist's Log

Flight No **B**.272... Date 26.02.07 Name GNP..... Page ..2... of ..3...

GMT	Run / Profile	Height	Hdg	GPS Position	Remarks (clouds, weather, visibility, winds, sea state etc.)
10.52					stratified w/ cumul Clouds again
					First 4 DS succesfully send
					10:37 / 10.41 / 10:44 / 10:49 5th: 10:54 : 10:57 / 11:08 / 11:11 / 11:31 / 12:01
10:58					strong winds 55 m/s 305°
11 01					~~Conv~~ starting again.
					~~more~~ wind 43 m/s 299°
					Captain feels jet further east than exp
11.04					wnd dropping 38 m/s 302°
					Streets of cumulus
11.12		26.8kft	345	61°24N 64°54	DS 11
					p = 343hPa. v = 344kt.
11.17					the dewp. has fallen by ~10°C in 3min
11.22					Clouds breaking up.
11.31		27 kft	330	~~62°00~~N 15°W	DS 12 FAILED? no launch line
					p = 344 hPa v = 341 kt.
11.47		27 kt	343	64°12'N 16°54'W	DS 13
					p = 344 hPa v = 341 kt.
					~~few~~ clouds. fantastic view over Vatna-jökull
12:00		22 00ft			spec. hum starts to be ~~>0~~ 2g kg 1225
12:15		2200ft.			q = 2 gkg^{-1} clear skies
1226		2000ft			wnd 11 m/s Cloudbase in front in FL030
1227					total water > 0 thick cloud just crossing 62N, going underneath cloud
1232					12 m/s 70° q = 3.11 g kg^{-1}
					⇒ incr. from 8 m/s at start in no change wind dir.

PTO →

12 39 out of cloud.
total water in cloud up to 0.34 gm^{-3}

flying at cloud tops 2000ft.
and then lower.

1242 wind changed from ~~270~~° to 300°

Dec. in Θ from 276 - 278 from 12 39 - 1242

1246 Θ fell by 3 degr. when going into the cloud?

1320 Heading = 259 V = 354 kt
Hight = 24 kft, p = 388 hPa.

60°N ~~14W~~ 18W DS14

1340 : Synoptic data bank

1425 (Croughly) Landing

FAAM Dropsonde Flight Log

Flight No.	B272	Date	26/02/2007
Page No.	of	Operator	BW

GMT	**Sonde No.**	**Event**	**Comments**
		e.g. launch, splashdown	*e.g. wind data? PTH data? Lat/Long* *NB strings of dropsonde data contain:* *time, pressure hPa, T deg C, RH %, wind direction deg, wind speed m/s, longitude, latitude, height m*
092230	1	Launch	376.10 -41.90 41.88 282.70 39.90 - 15.60 -18.987600 62.001800 7618.80
093139	1	Splashdown	1012.23 3.43 62.59 32.62 6.18 - 10.80 -18.888211 61.970373 332.94
	2	Not launched	No PCU detected on initialisation
	2		
092748	3	Launch	369.41 4.86 999.00 999.00 999.00 99.00 999.000000 99.000000 99999.00
093627	3	Splashdown	1012.45 3.38 66.11 52.34 6.08 - 11.40 -17.751281 61.957728 99999.00
093248	4	Launch	373.05 -9.62 1.91 269.80 95.47 0.00 -16.725608 62.047427 8042.54
093926	4	Splashdown	1011.60 1.87 79.40 999.00 999.00 99.00 999.000000 99.000000 359.63
093803	5	Launch	375.60 -44.30 14.22 292.80 33.30 - 16.20 -15.588500 62.057000 7626.40
094659	5	Splashdown	1011.65 2.47 72.09 999.00 999.00 99.00 999.000000 99.000000 377.72
094327	6	Launch	375.60 -44.70 17.54 295.30 32.30 - 15.30 -14.399000 62.056500 7627.10
095218	6	Splashdown	1012.29 1.10 92.98 48.03 7.99 - 10.87 -14.354172 62.043487 389.94
094854	7	Launch	375.70 -44.80 9.35 296.60 31.40 - 14.90 -13.172200 62.045600 7626.10
095736	7	Splashdown	1011.34 -0.13 94.20 62.37 8.05 - 12.00 -13.070902 62.044629 421.77
095344	8	Launch	374.74 -11.73 1.72 999.00 999.00 99.00 999.000000 99.000000 99999.00
100308	8	Splashdown	1012.04 0.09 93.08 26.51 1.64 - 10.84 -11.956015 62.022029 716.27
095836	9	Launch	375.50 -45.10 9.92 300.00 30.90 - 14.60 -10.991200 61.999400 7628.50
100750	9	Splashdown	1012.36 2.73 59.33 327.45 2.89 - 10.94 -10.846945 61.980267 99999.00
102145	10	Launch	375.50 -43.10 63.15 284.30 41.80 - 15.50 -11.003800 59.994700 7628.50
103051	10	Splashdown	1014.17 4.64 57.69 999.00 999.00 99.00 999.000000 99.000000 99999.00
105154	11	Launch	359.70 -42.60 29.27 305.40 59.30 - 14.90 -14.874100 60.003100 7928.50
110118	11	Splashdown	1012.30 5.92 60.14 187.12 5.82 - 10.89 -14.709942 59.984937 99999.00
111209	12	Launch	344.00 -46.60 54.64 301.00 44.00 - 15.00 -14.999900 61.508300 8236.70

112153	12	Splashdown	1011.26 2.02 94.99 999.00 999.00 99.00 999.000000 99.000000 361.61
113033	13	Launch	343.06 -13.93 1.41 999.00 999.00 99.00 999.000000 99.000000 8597.52
113624	13	Splashdown	1011.17 -0.10 45.85 100.49 4.87 -0.17 -14.928718 62.977819 99999.00
114706	14	Launch	344.10 -49.30 16.73 304.10 28.20 -13.50 -15.981600 64.267100 8234.20
115602	14	Land	965.71 -3.97 50.17 188.78 0.24 -8.54 -15.867948 64.227958 846.03
131957	15	Launch	328.90 -44.90 57.81 282.40 51.60 -14.70 -19.003600 60.002400 8542.90
132956	15	Splashdown	1010.77 6.68 65.50 999.00 999.00 99.00 999.000000 99.000000 99999.00

Flight: B272

KEY

- Not Fitted
- Fitted, Not Operated
- Duff Data
- Minor Problems
- OK

Thermometers
- Cabin Temperature:
- Heimann:
- Deiced Temp:
- Non-deiced Temp:

Hygrometers
- FWVS:
- General Eastern:
- Johnson Williams:
- Nevzorov:
- Total Water Probe:

Cameras
- Downward Facing:
- Forward Facing:
- Rearward Facing:
- Upward Facing:

Navigation + Aircraft
- Cruciform GPS:
- GIN Applanix:
- INU Honeywell:
- Radar Altimeter:
- RVSM IAS:
- RVSM Static Pressure:
- XR5 GPS:

Report Created 15/03/2007 12:12:26

Misc Core
- AMTG:
- AVAPS:
- Cabin Pressure:
- Fax machine:
- Printer:
- S9 Static Pressure:
- Satcom C:
- Satcom H:
- Turb Centre-Static:
- Turb Left Right:
- Turb Up-Down:
- Turb Horizontal Chk:
- Turb Vertical Chk:
- Weather Radar:

DLUs:
- DLU AERACK:
- DLU BBR Lower:
- DLU BBR Upper:
- DLU Core Chem:
- DLU Core Consoles:
- DLU Port Aft:
- DLU Port Fwd:
- DLU Stbd Fwd:

Radiometers
Lower:
- BBR (clear) Lower:
- BBR (IR) Lower:
- BBR (red) Lower:

Upper:
- BBR (clear) Upper:
- BBR (IR) Upper:
- BBR (red) Upper:

- ARIES:
- DEIMOS:
- IR Camera:
- JNO2 Lower:
- JNO2 Upper:
- JO1D Lower:
- JO1D Upper:
- MARSS:
- SHIMS Lower:
- SHIMS Upper:
- SWS:
- TAFTS:

Last Updated: 14/03/2007 15:55:15

Cloud Probes
- 2DC:
- 2DP:
- FFSSP:
- PCASP:

- ADA:
- CCN:
- CDP:
- CIP 100:
- CIP 25:
- CPI:
- CVI:
- SID1:
- SID2:

Aerosol
- CPC 3025A:
- Filters 47mm:
- Filters 90mm:
- Neph - Dry:
- Neph - Wet:
- PSAP:
- AMS:
- CPC 3025 (AMS)
- INC:
- VACC:
- CPC 3010A (CVI):

Chemistry
- CO Aerolaser 5002:
- NOx TE42C:
- Ozone TE49C:
- Ozone TE49:
- SO2 TE43C:
- TDLAS (NIR) CH4:
- TDLAS (NIR) CO2:

- FAGE:
- Formaldehyde:
- NOxy:
- ORAC:
- PAN:
- PERCA:
- Peroxide:
- PTRMS:
- TDLAS (1C):
- WAS Bags:
- WAS Bottles:

Misc Non-Core
- CASI/ATM:
- LIDAR:
- LTI:
- SAW Hygrometer:

Faults / Incidents Log

Flight No. B272
Date: 26 Feb 2007

Instruments

1.

2.

Aircraft

1.

Satcom-H Calls

Nil

Post Flight - Turb Probe Water Traps

1. Indicate Amount of Water: a) Nil b) 1-2 drops c) ¼ full or more d) Ice present
2. Emptied by:
3. Dried by:

MISSING LOG SHEETS:

The following log sheets are not available for flight B272:

Log	Reason
Pre-flighter log	No log available
Core Chemistry	No In Flight log except in cases of instrument problems
Cloud Physics	Not operated on this flight

Document control

Revision	Date	Author	Comments
r0	20 Mar 2007	Doug Anderson	Initial version missing the above noted logs
r1			
r2			

VIDEO RECORDINGS:

3 x Forward Facing Cameras
3 x Rearward Facing Cameras

Digital8 video recordings from this flight reside with :

Dr Ian A. Renfrew

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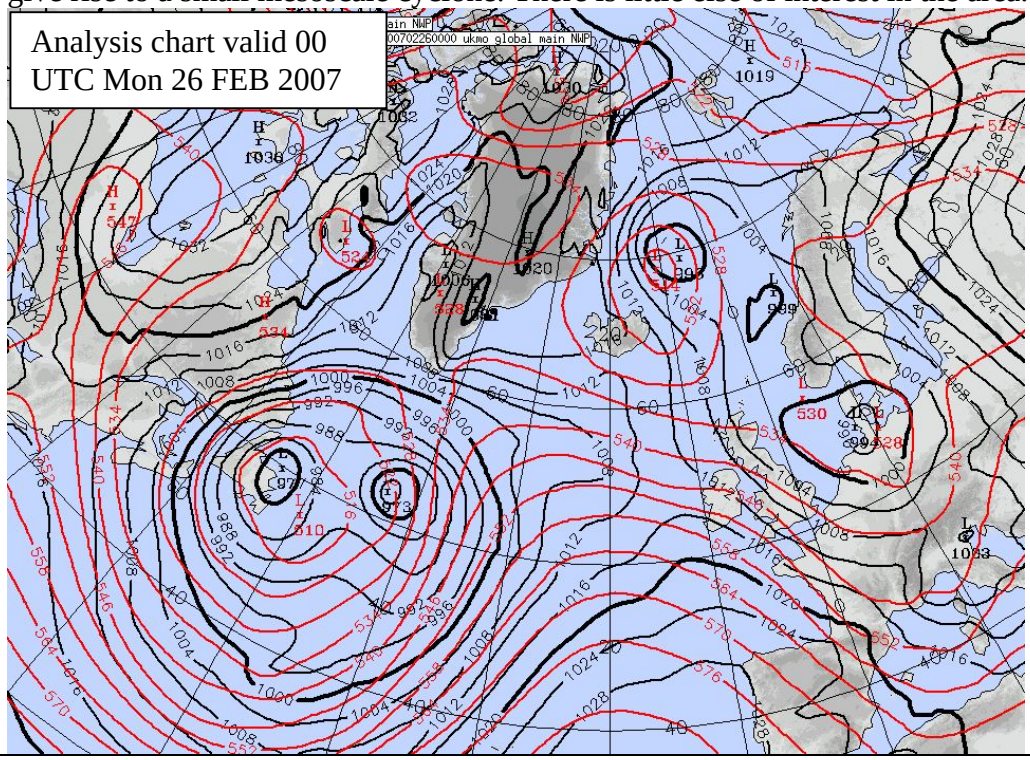
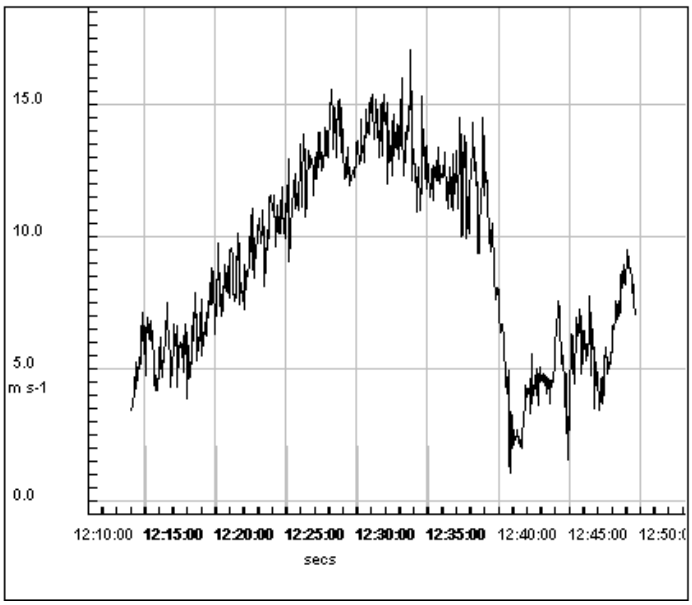
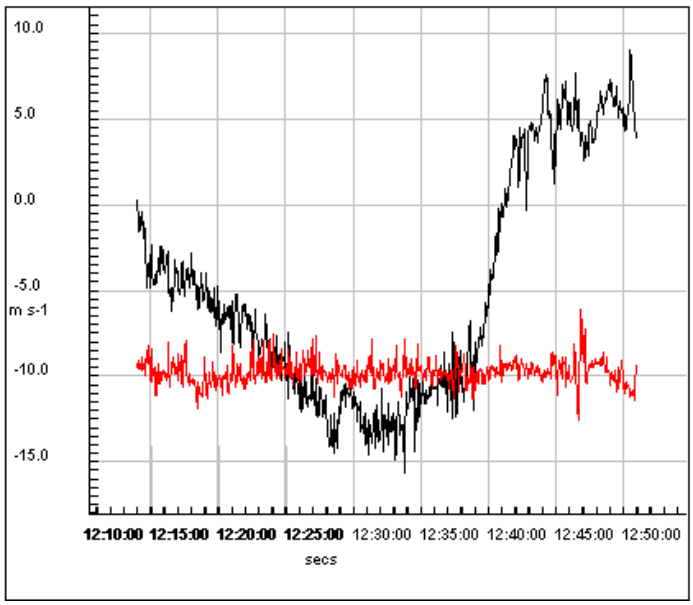
Daily weather summary 26 February 2007

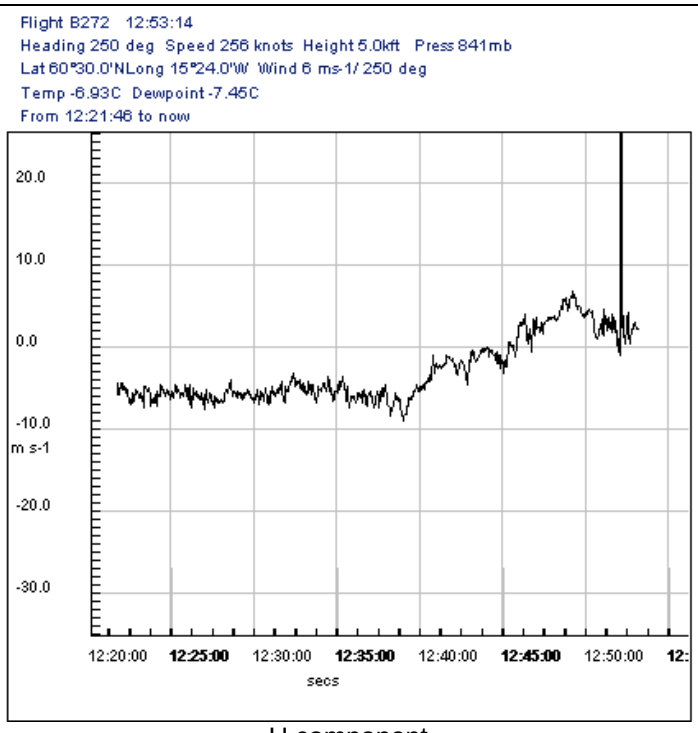
Large scale situation today:	The low off Newfoundland has filled to 977hPa with a second low passing it from the southwest. These low pressure systems merge during the day with a trough extending east across the Atlantic. Two new low pressure centres are predicted to form in this trough by the end of the day. The low to the northwest of Iceland is quasi-stationary. The cloud around this system is still well defined. The weather between Iceland and Greenland is dominated by the high pressure system over Greenland. The cyclone over the UK has moved off towards Denmark. The trough extending to the east, south-southeast of Iceland in the UKMO global was predicted to form a closed low in the forecast from the day before.
Features of interest:	The models have suggested that the trough to the south-southeast of Iceland will give rise to a small mesoscale cyclone. There is little else of interest in the area. 
Action:	The plan is to investigate the mesoscale cyclone to the south of Iceland along with an SAP flight.
Outlook for the next 24-48 hours:	The North Atlantic is dominated by the two low pressure systems which deepen to 966hPa and travel across towards the UK. The high pressure system over Greenland breaks up and the low to the northeast of Iceland moves away.
Outlook for the next 48-96 hours:	The first low moving towards the UK slows over Scotland before continuing on towards Scandinavia. The second low dissipates while a new centre forms in its northern trough, in the lee of the Greenland tip. A possible barrier flow begins to form to the north of Iceland on the 1st March, 2007.



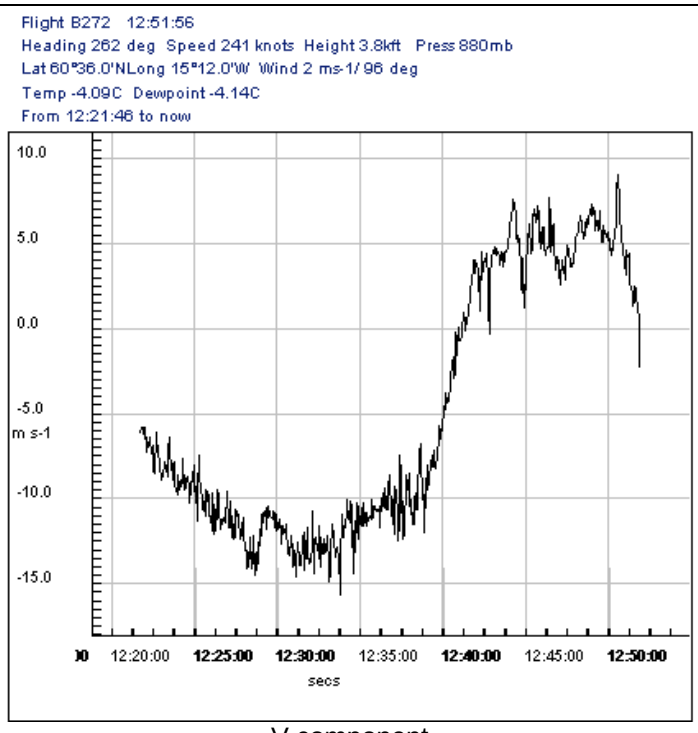
Wind Speed



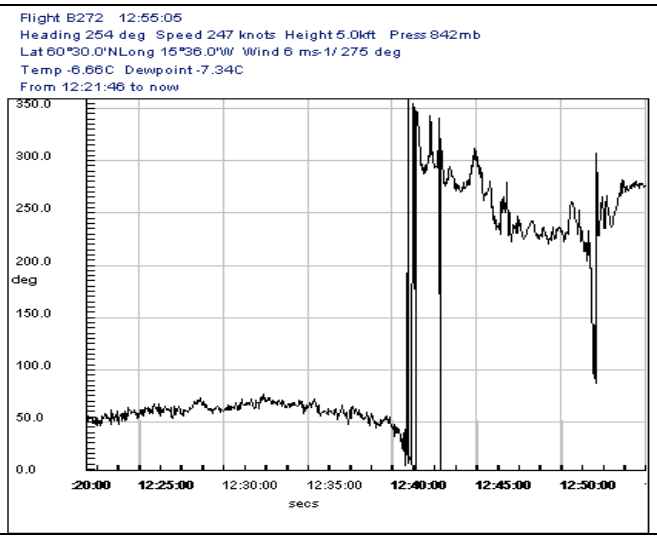
Wind Component

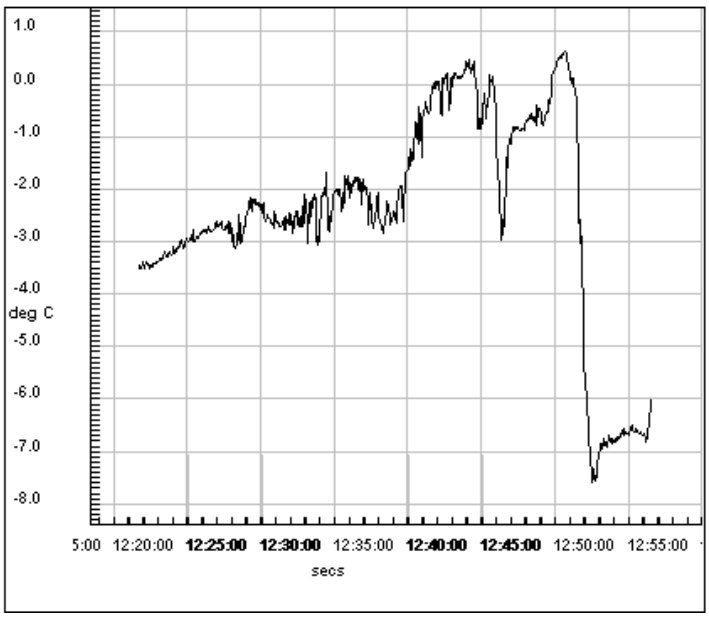


U component

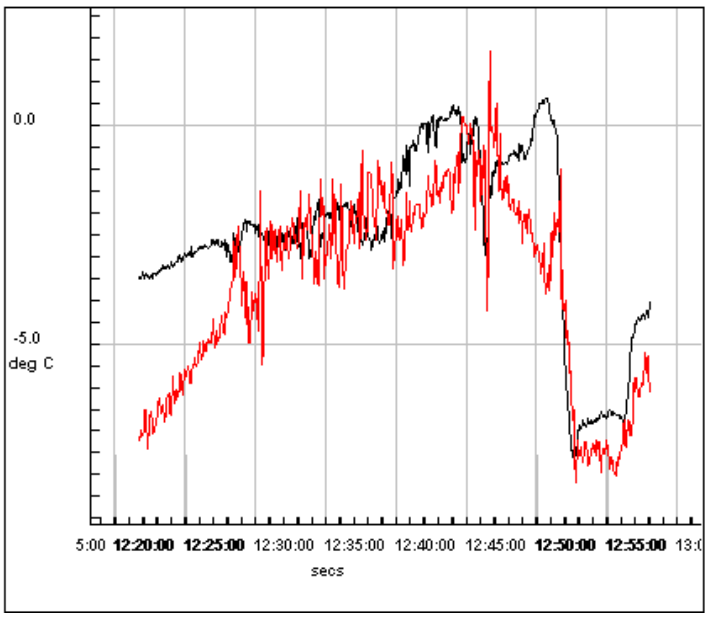


V component

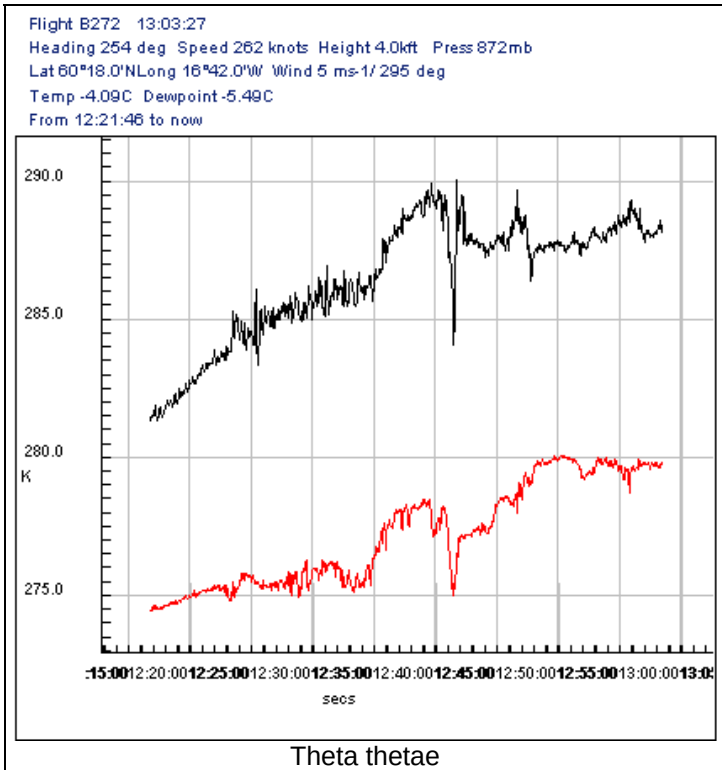




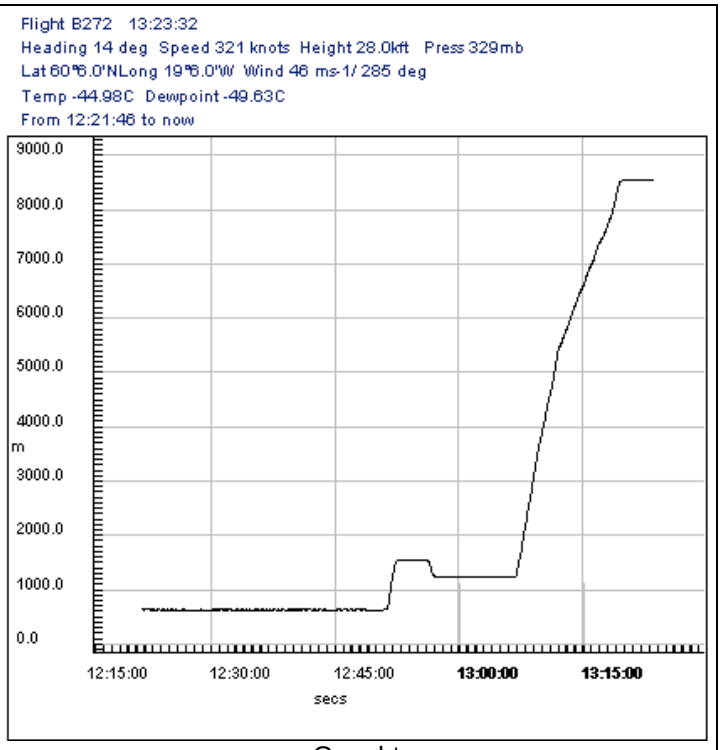
Temperature



Temperature and Dew Point Temperature

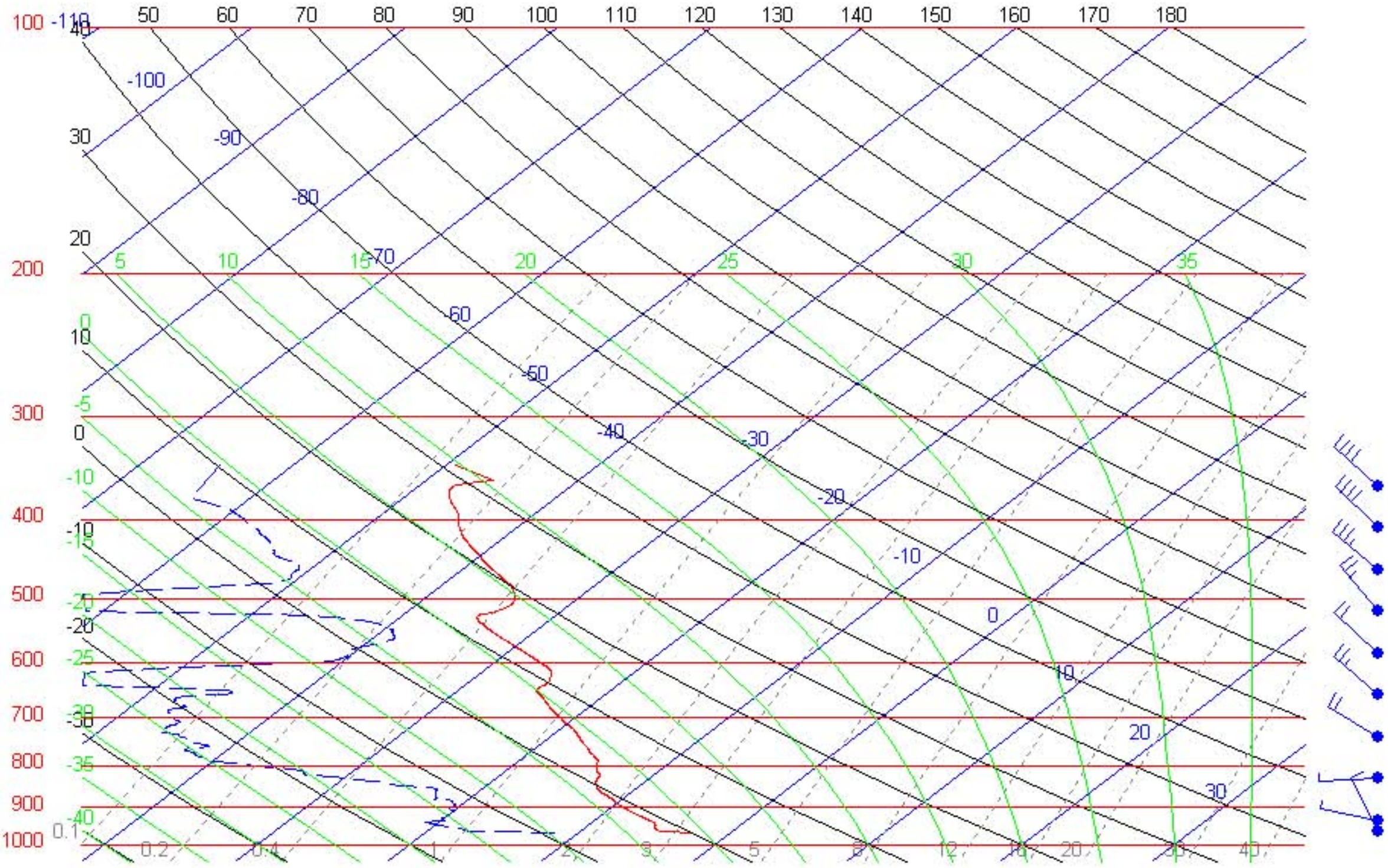


Theta thetae



Geopht

D20070226_114705.2 063239080 GFDEX, B272 None, None



Aspen V2.7.2.1, 26 Feb 2007 21:22 UTC